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(पहला पुनरीक्षण)

Indian Standard

BYPASS PROTEIN FEED FOR CATTLE — SPECIFICATION

(First Revision)

ICS 65.120

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

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Animal Husbandry, Feeds and Equipment Sectional Committee, FAD 05

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Animal Husbandry, Feeds and Equipment Sectional Committee, had been approved by the Food and Agriculture Division Council.

Dietary proteins in the ruminant diet are degraded in the rumen to peptides, amino acids and ammonia in varying amounts depending upon their solubility. The amount of amino acids available for absorption in the small intestine is the sum total of amino acids available from the microbial proteins and those derived from feed proteins which remain undegraded in the rumen but are subjected to enzymatic digestion in the intestines.

A significant portion of feed proteins, which escapes ruminal microbial degradation in the rumen are termed as bypass proteins or undegradable proteins (UDP). Keeping in view the higher efficiency of utilization of rumen undegradable proteins, it is desirable to formulate feeds containing optimum level of rumen undegradable proteins.

This standard was first published in 1996 to guide the manufacturers and users about the quality of bypass protein feed. A few model bypass protein formulae, which are being used by the cattle feed plants, are given in Annex D for guidance. It was observed over the years that the phosphate solubility method is not the true indicator of rumen degradability of protein meals and it is the nylon bag technique that could be used for this purpose. Moreover, UDP value of feeds and protein meals can be predicted by the Near Infrared Analyzer (NIR) technique, based on the values of nylon bag technique. In view of this, present standard was revised to incorporate the nylon bag technique for determination of rumen degradability of bypass protein feed for cattle. Besides, other values for crude protein, UDP, fibre and acid insoluble ash given in the standard have been revised.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

BYPASS PROTEIN FEED FOR CATTLE — SPECIFICATION

(First Revision)

1 SCOPE

This standard prescribes the requirements, methods of tests and sampling for bypass protein feed for cattle and buffaloes.

2 REFERENCES

The standards listed in Annex A contain provisions, which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated.

3 REQUIREMENTS

3.1 Description

Bypass protein feed shall be in the form of meal or pellets.

3.2 Ingredients

The ingredients for manufacture of bypass protein feed shall be selected from those listed in Annex B.

3.3 The feed shall be free from harmful constituents, metallic pieces and adulterants. The feed shall also be free from fungal growth, insect infestation and from fermented, musty or any other objectionable odour.

3.4 The material shall also conform to the requirements given in Table 1.

4 PACKING AND MARKING

4.1 Packing

Bypass protein feed shall be packed in clean, dry and sound jute bags with or without polythene lining. The mouth of the each bag shall be machine shielded.

4.2 Marking

Each bag shall be legibly marked or labelled to give the following information:

a) Name of the material;
b) Name of the manufacturer;
c) Net mass in kg;
d) Batch or Code number;

Table 1 Requirements for Bypass Protein Feed
(*Clause* 3.4)

Sl No.	Characteristic	Requirement	Methods of Test, Ref to	
			Annex of This Standard	Cl of IS
(1)	(2)	(3)	(4)	(5)
i)	Moisture, percent by mass, *Max*	11	—	**4** of IS 7874 (Part 1)
ii)	Crude protein (N × 6.25), percent by mass, *Min*	22	—	**5** of IS 7874 (Part 1)
iii)	Crude fat, percent by mass, *Min*	3.5	—	**7** of IS 7874 (Part 1)
iv)	Crude fibre, percent by mass, *Max*	10	—	**8** of IS 7874 (Part 1)
v)	Acid insoluble ash, percent by mass, *Max*	3.0	—	**10** of IS 7874 (Part 1)
vi)	Rumen undegradable protein (UDP), percent by mass, *Min*	14	Annex C	—
vii)	Common salt (as NaCl), percent by mass, *Max*	1.5	—	**4** of IS 7874 (Part 2)
viii)	Calcium (as Ca), percent by mass, *Min*	1.0	—	13433 (Part 1/Part2)
ix)	Available phosphorus (as P), percent by mass, *Min*	0.25	—	Annex F of IS 1374
x)	Vitamin A, IU/kg, *Min*	7 000	—	IS 15120
xi)	Vitamin D3 IU/kg, *Min*	1 200	—	Annex E of IS 2052
xii)	Vitamin E, IU/kg, *Min*	30	—	Annex F of IS 2052
xiii)	Aflatoxin B1, ppb1), *Max*	20	—	IS 13427 or IS 14718#

NOTE — The values for requirements Sl No. (ii) to (ix) are on moisture-free basis.

1) Aflatoxin B1 limits shall be reviewed from year to year on production of Indian and International data.

2) In case of dispute, test method indicated by # shall be the referee method.

e) Crude protein content;
f) Crude fibre content;
g) Calcium content;
h) Available phosphorus content;
j) Vitamin A content in IU/kg;
k) Vitamin D3 content in IU/kg;
m) Vitamin E content in IU/kg;
n) Rumen undegradable protein content;
p) Directions for use; and
q) Feeding recommendations for milk production, expressed in g/kg of milk. For example, bypass protein feed may be fed at the following rates for milk production:
    1) For cow — 400 g/kg milk
    2) For buffalo — 500 g/kg milk

4.2.1 *BIS Certification Marking*

Each bag may also be marked with the Standard Mark.

4.2.1.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the license for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

5 SAMPLING

5.1 Representative samples of the material shall be drawn and conformity of the material to the requirements of this standard shall be determined according to the methods prescribed in Annex H of IS 2052.

ANNEX A

(*Clause* 2.1)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
920 : 1972	Specification for common salt and cattle licks for animal consumption (*first revision*)
1070 : 1992	Specification for reagent grade water (*third revision*)
1162 : 1958	Specification for cane molasses
1374 : 2007	Poultry feeds — Specification (*fifth revision*)
1664 : 2002	Specification for mineral mixtures for supplementing cattle feeds (*fourth revision*)
1712 : 1982	Specification for cottonseed oilcake as livestock feed ingredient (*second revision*)
1713 : 1986	Specification for decorticated groundnut oilcakes livestock feed ingredient
1932 : 1986	Specification for mustard and rapeseed oilcake as livestock feed ingredient (*second revision*)
1934 : 1982	Specification for sesame oilcake as livestock feed ingredient (*first revision*)
1935 : 1982	Linseed oilcake as livestock feed ingredient (*first revision*)
2052 : 2009	Compounded feeds for cattle — Specification for (*fourth revision*)
2152 : 1972	Specification for maize gluten feed (*first revision*)
2154 : 1986	Coconut oilcake as livestock feed ingredient (*second revision*)
2239 : 1971	Specification for wheat bran (*first revision*)
3163 : 1965	Specification for rice polish
3440 : 1985	Solvent extracted linseed oilcake (meal) as livestock feed ingredient (*first revision*)
3441 : 1982	Specification for solvent extracted groundnut oilcake (meal) as livestock feed ingredient (*first revision*)
3591 : 1985	Specification for solvent extracted coconut oilcake (meal) as livestock feed ingredient (*second revision*)
3592 : 1985	Solvent extracted decorticated cottonseed oilcake (meal) as livestock feed ingredient (*second revision*)
3593 : 1979	Specification for solvent extracted rice bran as livestock feed (*second revision*)
4193 : 1986	Specification for guar meal as livestock feed ingredient (*first revision*)
7874	Methods of test for animal feeds and feeding stuffs:

IS No.	*Title*
(Part 1) : 1975	General methods
(Part 2) : 1975	Minerals and trace elements
13427 : 1992	Animal feeds and feeding stuffs — Determination of aflatoxin B1 content
13433 (Part 1) : 1992	Animal feeds and feeding stuffs — Determination of calcium: Part 1 Titrimetric method
IS/ISO 14718 : 1998	Animal feeding stuffs — Determination of aflatoxin B1 content of mixed feeding stuffs — Method using high performance liquid chromatography
15120 : 2002/ ISO 14565: 2000	Animal feeding stuffs — Determination of vitamin A content — Method using high performance liquid chromatography

ANNEX B

(*Clause* 3.2)

INGREDIENTS FOR BYPASS PROTEIN FEED

Grains

Barley (*Hordeum vulgare*)

Maize (*Zea mays*)

Milo (*Sorghum vulgare*)

Bajra (*Pennisetum typhoides*)

Grain By-products

Rice polish (*see* IS 3163)

Wheat bran (*see* IS 2239)

Maize gluten (*see* IS 2152)

Solvent extracted rice bran (*see* IS 3593)

Oilcake and Meals

Coconut oilcake (*see* IS 2154) and Solvent extracted coconut oilcake (meal) (*see* IS 3591). Cottonseed oilcake (*see* IS 1712) and Solvent extracted decorticated cottonseed oilcake (meal) (*see* IS 3592).

Groundnut oilcake (*see* IS 1713) and Solvent extracted groundnut oilcake (meal) (*see* IS 3441)

Linseed oilcake (*see* IS 1935) and Solvent extracted linseed oilcake (meal) (*see* IS 3440). Mustard and rapeseed oilcake (*see* IS 1932) and Solvent extracted mustard and rapeseed oilcake (meal).

Sesame oilcake (*see* IS 1934) and Solvent extracted sesame oilcake (meal).

Soybean oilcake and solvent extracted soybean oilcake (meal)

Guar meal (*see* IS 4193)

Industrial By-products and Others

Molasses (*see* IS 1162)

Mineral mixture (*see* IS 1664)

Salt (*see* IS 920)

ANNEX C

[*Table* 1, *Sl No.* (vi)]

DETERMINATION OF RUMEN DEGRADABLE PROTEIN (RDP) AND RUMEN UNDEGRADABLE PROTEIN (UDP)

C-1 APPARATUS

C-1.1 Nylon Bag

C-1.2 Plastic Tube

C-1.3 Rubber Band/Nylon Thread

C-1.4 Hot Air Oven

C-1.5 Washing Machine

C-1.6 Rumen Cannulated Animal

C-2 PROCEDURE

C-2.1 Preparation of Sample

C-2.1.1 Weigh 3.0 g sample for dry feeds (hays, straw etc) or 5.0 g sample for protein supplements and transfer it to nylon bag (35-50μμ pore size).

C-2.1.2 Record the weight of bag plus sample.

C-2.1.3 Attach the nylon bags to the respective plastic tubes for incubation and place them with bags in the rumen and tie the bags with cannula with a piece of nylon thread.

C-2.1.4 Incubate the bags for 4, 8, 16, 24, 48, 72 and 96 h for roughage and for protein sample 2, 4, 8, 16, 24 and 48 h.

C-2.1.5 Withdraw the bags and immediately place in a bucket of cold water to prevent further fermentation and to wash off the feed particles adhering to the outside of the bags.

C-2.1.6 Transfer the bags in washing machine for 20 min for cold water washing. The bags could also be washed under running cold water in laboratory until the washing is clear.

C-2.1.7 Detach the nylon bags from the tubes by cutting the rubber bands.

C-2.1.8 Dry the bags at 60-65°C for 48 h and weigh the bags immediately after drying.

C-3 CALCULATION

C-3.1	Empty bag weight	(W)
C-3.2	Bag + feed sample before incubation	(W_1)
C-3.3	Bag + residue after incubation	(W_2)
C-3.4	Percent dry matter in the feed sample	(DM percent)
C-3.5	Sample dry matter weight	$(W_1 - W) \times$ DM percent = (W_3)
C-3.6	Residue dry matter weight	$(W_2 - W) = (W_4)$

DM disappearance (%) $= \dfrac{W_3 - W_4}{W_3} \times 100$

C-3.7 Degradation Kinetics

The degradation kinetics of the incubated feedstuffs may be calculated by curvilinear regression of DM and other degradable components of the feed determined by nylon bag technique.

C-3.7.1 Potential degradability $(P) = a + b\,(1 - e^{ct})$

where

a = y-axis intercept at time 0 that represents soluble and completely degradable substrate washed out of the bags (0 h disappearance)

b = difference between the intercept (a) and the asymptote that represents the insoluble but potentially degradable substrate

c = the rate of disappearance of component ‘b’ per hour (rate constant)

t = incubation time

$a+b$ = asymptote of the disappearance curve

$1 - (a+b)$ = the undegradable portion of a sample

C-3.7.2 Effective degradability $(E) = \dfrac{a + bc}{(c + k)}$

where

k = rumen small particle out flow rate.

The above equations assume that component ‘b’ disappears at a constant fractional ‘c’ per hour.

C-4 NEAR INFRARED ANALYZER (NIR) TECHNIQUE

Near Infrared Analyzer (NIR) can be used for measuring UDP values by developing equations with the nylon bag technique. However, in case of dispute nylon bag technique shall be considered as final.

ANNEX D

(*Foreword*)

MODEL BYPASS PROTEIN FEED FORMULAE

A few model bypass protein feed formulae are given below:

Sl No.	*Ingredients*	*Examples of Bypass Protein Feed Formulae, Percentage*				
		I	II	III	IV	V
i)	Maize	20	—	22	25	—
ii)	Jowar	—	25	—	—	22
iii)	Rice polish	15	12	10	10	10
iv)	Treated groundnut meal	—	10	—	—	—
v)	Treated rapeseed meal	10	—	10	10	10
vi)	Treated sunflower meal	—	10	—	—	—
vii)	Treated soybean meal	15	—	15	—	—
viii)	Treated cottonseed meal	—	—	—	15	—
ix)	Treated guar korma	—	5	—	—	15
x)	Rice bran extraction	25	23	28	25	28
xi)	Mineral mixture	2	2	2	2	2
xii)	Calcite powder	1.5	1.5	1.5	1.5	1.5
xiii)	Common salt	1.5	1.5	1.5	1.5	1.5
xiv)	Molasses	10	10	10	10	10

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Amendments Issued Since Publication

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